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THE PRIVATE PRACTITIONER *AS PIONEER IN* PREVENTIVE MEDICINE

BEING THE

ANNUAL ORATION OF THE HUNTERIAN SOCIETY: 1926

BY

SIR GEORGE NEWMAN

K.C.B., M.D., D.C.L.

OXFORD UNIVERSITY PRESS

LONDON: HUMPHREY MILFORD

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NEWMAN

THE PRIVATE PRACTITIONER AS PIONEER IN PREVENTIVE MEDICINE

The Background of Biology and Pathology.

Twenty years before the birth of John Hunter there were born two boys, one in Burgundy and one in Sweden, who were to live to transform man's knowledge of biology. Buffon, the son of a wealthy aristocrat, devoted his leisure to the compilation of an encyclopaedia of natural history. This famous book of fifteen volumes, issued between 1749 and 1767, gathered together the knowledge then available in the province of Nature. It has been described both as a monument and a grave. In any case, it is one of the chief landmarks in the history of biological learning. Moreover, Buffon raised questions which, though he did not answer them, set men's minds agog, for he was one of the first to believe in the mutability of species and the effect of environment upon them. Linnaeus, the Swede, was both a genius and a good workman. He studied medicine and botany at Upsala, Leyden, and in England, and when twenty-nine years old produced with the encouragement of Boerhaave his great book, *Systema Naturae*, which forms the starting-point of modern biology. He brought to bear upon the accumulations of the past a critical faculty, a descriptive power, and a logical sense of classification which initiated the scientific move-

ment of exact observation as the basis of differentiation of species in plants and animals. He handed his torch to his friends of the Jussieu family, to Cuvier the comparative anatomist, and to our own Erasmus Darwin, who by his first wife was the grandfather of Charles Darwin, and by his second of Francis Galton.

Here, then, is the mental background of natural history to the Hunterian period. It was a time of observation and classification. William Hunter's scientific godfathers and teachers were Cullen and Monro primus, both of them naturalists, inspired by the wide and balanced apprehensions of Boerhaave, the expositor; and William Hunter taught John Hunter. At the foundation of all John Hunter's work lay the deep broad basis of biology.

> 'Human anatomy was taking its place in his mind as but part of all anatomy', says Mr. Paget; 'he must know the whole animal world, every living structure in it; must dissect everything, noting all different forms and arrangements of the organs, each method of nature to adapt them to the necessities of life. . . . Hunter went forward from human anatomy to all anatomy and physiology, and from these to medicine and surgery; from all of them together to profound study of life, alike in health and in disease, in all structures, at all stages. . . .' 'It was not', said Sir Everard Home, 'his intention to make dissections of particular animals, but to institute an inquiry into the various organizations by which the functions of life are performed, that he might thereby acquire some knowledge of general principles.'[1]

His biological instinct followed two directions, the human body in health, the human body in disease. When John Hunter came to London at the invitation of his elder brother, Haller had been for ten years professor of biology, anatomy, and medicine—pregnant combination—in the University of Göttingen, a post to which he was appointed on the advice of Sir Hans Sloane by King George II of England, who was also Elector of Hanover. Haller is the

[1] *John Hunter, Man of Science and Surgeon*, by Stephen Paget, 1897.

supreme and predominant physiologist of the eighteenth century. Indeed, his *Elementa Physiologicae* (1757) forms a dividing line between modern physiology and all that went before. We shall remember what went before. It was the discovery of the circulation of the blood by Harvey in 1616, the new physics of Descartes and Borelli, the capillary circulation of Malpighi, and the anatomy of the secreting glands. There was in that day, as in this, a new birth of medicine. Harvey had opened the gates of the garden of physiology, and it was Haller who gathered the first-fruits of clinical application, particularly in relation to digestion, to nervous irritability, and to respiration. An understanding of the process of respiration and its relation to the nutrition of the body by the blood-stream was awaiting exact knowledge of the constitution of the air we breathe. Now in the same year as the publication of Haller's *Elementa*, Black, following Van Helmont, discovered carbonic acid gas; in 1772 Rutherford of Edinburgh discovered nitrogen; in 1774 Lavoisier, the brilliant French aristocrat who subsequently perished by the guillotine, following Priestley, recognized oxygen; and hydrogen was first made definite and clear by Cavendish in 1781. These four discoveries revolutionized man's knowledge of the physiological purpose of respiration. All this was happening in the spacious days of the Hunters, and it opened the book of physiology to the medical practitioner.

The practitioners were concerned after all with disease, and here too, in the understanding of the pathological aspect of biology, advance was being made in their day. For the long period of half a century the great Morgagni was professor at Padua. Like Sydenham he communicated his knowledge and discoveries, in the form of letters to his friends, on the sites and causes of disease (1761). This book of five volumes of seventy letters became the basis of modern pathology. In it he not only described many hitherto undefined morbid conditions, particularly diseases

of the heart and circulation, but he made the gross anatomy the basis of his descriptions, and he related the conditions found *post mortem* with those in the living patient. Both anatomy and autopsy were directed to the service of medicine. This was a new orientation of pathology, which led the practitioner to think anatomically and pathologically in his clinical work, and to interpret signs and symptoms as the diseases developed. In after years Baillie and Bichat carried forward the enterprise.

The Coming of John Hunter.

This in brief was the scientific atmosphere of the age into which John Hunter came, and to which he made his unique contribution. If we would understand the effect of the eighteenth century on modern medicine, we must get this root-idea into our minds. First, the science of the period was characterized by a systematic view of natural history, and the art and science of medicine were given a setting in the larger subject of Nature; secondly, the meaning of physiology was being interpreted, and form was being related to function; and thirdly, there was being instituted a search into the causes of disease and its varied manifestations. John Hunter, anatomist and surgeon, came as an explorer of genius into this field. Lacking the ordinary educational equipment of his brother William, he brought to bear upon his task untiring enthusiasm for knowledge and diligence in its pursuit, a penetrating power of observation and insight, and an inquisitive, experimental and inductive mind. Hence it is not surprising that with the advent of John Hunter the purpose of practical medicine ceased to be an authoritative and empirical mode of treatment, and began to be viewed from the standpoint of Nature, of a living physiology and pathology. For Hunter was primarily, and in the true sense, a naturalist. He dissected, not only every day, but 'from the rising to the setting of the sun', and described 500 different species of

animal; more than that, he watched Nature at work, and standardized his deductions by her plumb-line. As a physiologist he held that the blood, a living fluid, was the basis of nutrition, that structure is the ultimate expression of function, that embryology bespeaks a unity throughout Nature, that the function of the lower animal is a simpler form of the higher, and that both forms and function must be studied on a comparative basis all through the living world. In pathology it is the same. To him abnormality is an aberrant or arrested growth, and disease a process and not an entity, against which the body reacts by the restorative defences of its own tissues. Thus in his work as a practitioner he was first an exact clinical student, though without instruments of precision; then a careful observer, then a rationalist. As an explorer he was a collector (of 13,000 specimens), then an observer and experimentalist, then again a rationalist. Having acquired few prejudices he thought biologically, and without elaborate doctrine; his principle of treatment was a reliance on the recuperative forces of Nature. All this lay athwart the medical learning of his day, and brought him into collision with others. But because of his first-hand knowledge and his genial human spirit he became a great teacher, and his pupils carried his legacy into all departments of medicine and surgery, and not least into the ever-expanding realm of Preventive Medicine. For, if we will but think about it, the foundations of Preventive Medicine are an understanding of and a reliance upon the laws of Nature, as they concern all forms and conditions of life; an appreciation of the capacity of the physiological functioning of the human body and its inherent powers of repair; and a knowledge of the cause and circumstance of disease. Not as an anatomist nor yet as a surgeon, but as a naturalist who was a co-ordinator and explorer of the unity of the human body, John Hunter must rank as one of the fathers and founders of modern Preventive Medicine.

The eighteenth century was the beginning of Preventive

Medicine, not because it was characterized by a high standard either of sanitation or of personal or communal health—for this was not the case—but because it was a time when physiology and pathology first began to be integrated with clinical medicine and surgery, when a conception of laws in health and disease took the place of fate or empiricism, and when the aspects of infectious disease in the aggregate, that is epidemic disease, were more closely studied in a spirit of scientific curiosity by more medical practitioners than at any previous time in our history. They became, perhaps half-unconsciously, the successors of Thomas Sydenham as he himself followed Hippocrates. Men began dimly to see Preventive Medicine, not as a small by-product of Medicine dealing with 'drains and stinks', but the primary business of all medicine, and concerned not only with disease, but with the physiological capacity and building up of the human species. We have not always retained this vision, but this in fact was the vision of the forward-looking minds of the eighteenth century. It was part of the imagination and adventure of the critical, rationalist and inventive spirit, yes, and of the larger sympathy of man with man, which in all departments of human endeavour made the eighteenth century 'the great heroic age of England'.

The Channels of his Influence.

The influence of John Hunter in this situation was pervasive and cumulative rather than direct and decisive. Nevertheless, immediately he accomplished three great things. First, he demonstrated rather than introduced the place of morbid and comparative anatomy in all clinical work. Morgagni systematized, but Hunter made actual and routine the practice of anatomical and pathological thinking. Secondly, not being a bookman himself, he impressed his generation with the necessity of personal observation and experiment. 'Did you go yourself and examine this,

or how do you *know*?' asks Socrates of Glaucon. It is of the very essence of scientific inquiry. Hunter seems to say to the practitioner of his day: 'Go and look for yourself; don't theorize but try; observe *closely*, collect your facts, then draw your deduction.' He was listened to at once only by his own pupils and surgical contemporaries, but his influence steadily spread to the whole profession. Nor was he alone. Other leaders in the eighteenth century were saying the same thing before and after him, but he said it and did it with greater perseverance and emphasis and on a larger scale. Writing to Dr. Staunton in 1762, Johnson said, 'Trust as little as you can to report; examine all you can by your own senses'. Thirdly, Hunter was not only a student of Nature's ways, but he accepted Nature's forces in his practice. There was a widespread intellectual return to natural science in his time, but he practised natural *art* in his reliance on the recuperative powers of the human body in his treatment of disease. Thus he became, as Sir Arthur Keith has shown, one of the founders of modern orthopaedics.

These were the things he did directly in his productive period from 1760 to 1793. But his fourth great contribution, perhaps the greatest of all, was his legacy to his pupils, who became the leaders of the next generation.

Hewson of Hexham came to the Hunters' school in 1759, and when John went abroad in 1760 he was left in charge, subsequently becoming a partner with William. He continued the physiological research then begun, and discovered the lymphatic system of birds, reptiles, and fishes, and exploring the properties of the blood established the fact that coagulation depended on the creation of a 'coagulable lymph' in the plasma.

Cruikshank, described by Johnson as 'a sweet-blooded man', succeeded Hewson as William Hunter's assistant, and carried on the school after William's death in conjunction with Matthew Baillie. He investigated the repair of divided nerves, the physiology of absorption, and the

excretory power of the skin. Subsequently he was one of the founders of the dispensary system. Upon Baillie, the nephew of the Hunters, who joined their school in 1779, fell their mantle of pathology. He was not only, like them, a great dissector and morbid anatomist, but he transmitted their views in his own classic text-book which was in universal circulation for two generations. He was also a great practitioner and one of the founders of modern medical education.[1]

Then there were the pupils who carried on the surgical tradition of John Hunter — Cline at St. Thomas's, Sir William Blizard at the London, Sir Astley Cooper at Guy's, Abernethy at St. Bart's., Hey at Leeds, White at Manchester, and Physick, who carried the torch of surgery to Pennsylvania in 1794. But William Shippen and John Morgan, who came here for their studies, had already taken back the ideas and teaching of the Hunters to the same city, and became the founders of the Medical School in Pennsylvania.[2] Lastly, two of the most remarkable men who have ever adorned the profession of medicine, Thomas Young and Edward Jenner, both learned at the feet of John Hunter in Windmill Street, and whilst the discoveries accredited to them were not directly due to Hunter's initiation, their inspiration was his own.[3]

[1] *The Works of Matthew Baillie*, by T. Wardrop, 1825.

[2] Apart from the establishment of a Chair in Medicine at the University of Mexico at the end of the sixteenth century, the Medical School attached to the University of Pennsylvania was the first university medical school in the United States of America. It was founded in 1751 by Dr. Thomas Bond, with the aid of Benjamin Franklin. When Bond studied in England he knew Fothergill, who also helped Shippen on his return to America in 1762. Shippen used Fothergill's anatomical diagrams in his first course of lectures. Morgan, another American student in England, returned to Philadelphia in 1765 and Rush in 1769. In their construction of Medical Schools, these four pioneers followed the Edinburgh model and the teaching they had received from Fothergill and the Hunters. (See *Dr. John Fothergill and his Friends*, by R. H. Fox, 1919, p, 366.)

[3] See also *Memoir of William and John Hunter*, by G. C. Peachey, 1924.

The Bills of Mortality.

The first half of the eighteenth century is often described by the historian as one of exceptional national prosperity. With certain exceptions, there were abundant harvests, low prices, and large exports of corn. The people lived in the villages on 'sustenance agriculture', and London and Bristol were the two largest towns. Men bowed and scraped punctiliously over their snuff-boxes; the philosophers droned tediously in their formal gardens; the wigs and the music were alike precise. Yet it was a time of national expansion, of commercial success, and of cheap living for the masses of the people. As we learn from the novels of Fielding and Richardson, the middle classes were comfortable and complacent; and Hallam and Lecky join in declaring that the times were 'the most prosperous England had ever experienced'. Pope's lyric was designed to sing rather than to read—

> Where'er you walk, cool gales shall fan the glade,
> Trees where you sit shall crowd into a shade;
> Where'er you tread, the blushing flowers shall rise,
> And all things flourish where you turn your eyes—

and Hogarth, Reynolds, and Gainsborough prove that the century was not blind to colour and design. Nevertheless, the period had its unwholesome aspect. The health of London was never worse, nor was the country as a whole much better. Typhus, small-pox, and malignant scarlet fever abounded. The following table gives the death-rates of the period as compared with the last half-century.[1]

[1] 'Health of London in the Eighteenth Century', *Proc. Royal Society of Medicine*, vol. xviii, No. 11, September 1925, p. 74.

Mortality rates in the eighteenth century.

Crude death-rates per 1,000.[1]

	London.	*England.*
1701–10	29·4	28·6
1711–20	32·8	31·1
1721–30	37·8	34·9
1731–40	36·2	35·8
1741–50	34·7	33·0
1751–60	28·2	30·3
1761–70	32·0	30·3
1771–80	29·5	31·1
1781–90	26·4	28·6
1791–1800	26·9	26·9
		England and Wales.
1871–80	22·4	21·3
1881–90	20·3	19·1
1891–1900	19·2	18·2
1901–10	15·8	15·4
1911–20	14·9[1]	14·3[1]

The figures speak for themselves, but it must be said that the high mortality of 1721–50 was due not to pestilence so much as the social habits of the people, the immigration into London, and particularly to alcoholic excess. The expectation of life at twenty years of age was fifteen years less than at present. Again, child-birth was a risky proceeding for mother and infant. The maternal death-rate before the establishment of lying-in institutions (from 1740 onwards) was extremely high. Things were much improved thereafter, but even the mortality in the institutions reached 1 in 42 (1749), though it fell in fifty years to 1 in 914 lying-in women admitted. The children fared even worse. The Bills of Mortality of the period as compared with the last decennium (1915–24) are detailed on p. 13. Thus it will be seen that it was not until after 1770 that the general and infant mortality began to decline. The black period was from 1720 to 1770. Gainsborough painted delectable pictures of pretty children, yet at his zenith 50 per cent. of all the children died before they were five years old.

[1] Including war years, figures approximate only.

Births and Deaths under five years of age, according to the London Bills of Mortality, for 100 years in five periods of 20 years each, and the number dying under five years out of 100 born.[1]

	1730–49	1750–69	1770–89	1790–1809	1810–29	1915–24
Total Births	315,456	307,395	349,477	386,393	477,910	927,473
Total Deaths under five years	235,087	193,694	180,058	159,571	151,794	128,739
Dying per cent. under five years	74·5	63·0	51·5	41·3	31·8	13·8

Main Currents of Preventive Medicine in the Eighteenth Century.

(i) *Exploration and Prevention of Epidemic Disease.*

I now turn to consider briefly the main currents of Preventive Medicine as they showed themselves in the Hunterian period. And the first and most obvious is that concerned with the exploration and prevention of epidemic disease. After 1666, plague, though incidental and sporadic, no longer swept the country as it had done for three centuries before 1665. Dr. Richard Mead's famous *Short Discourse concerning Pestilential Contagion* appeared in 1720. It was written at the request of 'the lords of the regency' on the occasion of the outbreak of plague at Marseilles in 1719, the infection of which it was feared would spread to England. So disturbed was public opinion that seven editions appeared in one year. The book is of historical interest as the first report on epidemiology produced by a medical practitioner at the bidding of the State. The Discourse discussed the origin and nature of the plague, the causes of its spread (alleged to be diseased persons, infected goods, and a corrupt state of the atmosphere), and the measures to be taken against it.

[1] *Vital Statistics*, by W. Farr, 1885, p. 195. See also *Proc. of Royal Society of Medicine*, Sept. 1925, pp. 73–84 (Brownlee); *London Life in the Eighteenth Century*, by M. Dorothy George, 1925.

Mead recommended the appointment of a Council of Health with plenary powers, of 'searchers' for the dead, and of 'skilled physicians' to attend the sick. He advocated certification of affected persons, the prompt isolation of the sick, and the disinfection of both persons and houses. The expenses of carrying out his methods were to be chargeable on the public. He cited Ferrara in Italy as a town where such measures had proved successful in 1630, as also in Rome in 1657. Even at Poole in Dorset the plague had been stayed in this way. 'The principal management of this whole affair', says Mead, 'consisteth in two things: (i) in separating the sick from the sound; and (ii) in cleaning well the houses which had been infected.'[1] As it happened, there was no occasion for putting into force Mead's proposals, as the plague did not reach England in epidemic form.

The diseases which tested the skill of medical practice in the eighteenth century were small-pox, influenza, puerperal sepsis, scarlet fever, and typhus fever. First, they had to be diagnosed and differentiated, and secondly, they had to be treated or prevented. At no period in English medicine has there been such a bold and significant attack upon epidemic disease by the medical practitioner as that which characterizes the eighteenth century. From 1720 onwards, we have an astounding record of the pioneering efforts of practitioners to study and understand and grapple with these diseases. There lie before me as I write references to upwards of 150 private practitioners, excluding medical men in the services, who investigated epidemic diseases in England within the Hunterian period. The best epidemiologists of the time were not in London, but at Plymouth, Chester, Manchester, Newcastle, York, Ripon, Halifax, Kidderminster, Dublin, and Cork, and it is not surprising to find that the result was the establishment for the first time of some of the principles of epidemiology and the prevention

[1] *A Discourse on the Plague*, 1720.

of disease which are now of common knowledge and acceptance. 'Never think it clever', said Johnson, 'to call physic a mean study.'

Let me choose one or two examples. There was practising in Chester from 1767 to 1793 a highly observant medical man named John Haygarth. He was born there in 1740, and after being educated at Edinburgh he returned to practise in his native city. In 1798 he retired to Bath, and there he died twenty-nine years later. Several years after starting practice he began his epidemiological inquiries into small-pox and typhus, and an enumeration of the inhabitants of Chester in order to check the incidence and progress of disease, and to introduce a system of notification. His description of typhus fever was one of the first and most reliable, and this led him to formulate the nature and conditions of febrile infections. He took two villages for comparative purposes and made observations upon differential symptoms, proportions of population infected and insusceptible, the channels, dosage, and conditions of infection, effect of ventilation and uncleanliness, distance over which infection is carried, and above all the length of the 'latent', or, as we now call it, incubation period. Upon these data he established the necessity for isolation (1775) and drafted rules for the institution and conduct of fever hospitals. Thus Haygarth, the medical practitioner of Chester, was one of the first to distinguish different kinds of fever by their periods of incubation, and to suggest their notification, and he was the first to insist on isolation, a practice begun at Chester in 1783, and followed at Manchester in 1796, and subsequently at Liverpool, Edinburgh, Newcastle, Dublin, and other towns, in the institution of what were then described as Houses of Recovery.[1] Haygarth also made a valuable study of acute rheumatism, and described rheumatic nodules in 1780.[2]

[1] *Letter to Dr. Percival on the Prevention of Infectious Fevers*, by J. Haygarth, M.D., F.R.S., 1801.

[2] *A Clinical History of Acute Rheumatism.*

I have mentioned Haygarth as a type of the group of eighteenth-century practitioners who, combining their clinical work with communal health, allowed their conceptions of the latter to grow out of their observation of their patients. He was not in point of time the first of his group. Before him there had been Huxham, Heberden the elder, and Fothergill; his contemporaries were Percival, Withering, and Lettsom; and after him came Willan and Parry. Heberden was described by Dr. Johnson as 'the last of the great physicians', and indeed his distinguished bearing, his sweetness of manners, and his deep sense of religion raised him to an uncommon height in public and professional esteem. He was an accomplished Greek and Hebrew scholar and a great note-taker, leaving behind him exceptionally valuable commentaries on chicken-pox, measles, night-blindness, 'epidemical cold', the pulse, and angina pectoris. From the clinical notes of a lifetime, he produced his great commentaries on the *History and Cure of Disease*, published after his death in 1801 at the age of ninety. Sir Norman Moore said Heberden owed nothing to books, but everything to his own observation of disease in the living patient, and this without any of the modern instruments of precision. Heberden agreed with Cullen that there are more false facts in medicine than false theories, and he set himself to check and record facts as he found them during a length, extent, and variety of opportunity rarely given to any man. Fothergill's practice was also exceptionally large, like his circle of friends; and out of both was born the exceptionally wide influence which he exercised upon his day and generation in this country and in America.[1] His study of epidemic sore throat in 1747, a form of malignant scarlet fever, is the scientific work for which he is best known; but he also wrote many short papers embodying his observations on disease met with in his practice, including the uses of drugs, sciatica, tuberculous meningitis, hydrophobia, epilepsy, megrim, phthisis, pig-

[1] *Dr. John Fothergill and his Friends*, by R. H. Fox, 1919.

ment poisoning, and influenza. He was a botanist, a meteorologist, and a philanthropist, and related all these subjects to his study of disease. Diet, fresh air, and exercise were leading features in his treatment. He gave a second place to bleeding, purging, and blistering, and relied upon the stimulation of vital processes and resistance of Nature. 'How many lives were lost', wrote Withering in 1793, 'until Dr. Fothergill taught us to withhold the lancet and the purge.' Like Fothergill, Withering of Shropshire and afterwards Birmingham was a botanist who studied scarlet fever and tuberculosis. He also made analyses of waters, was a climatologist, and introduced digitalis. His *Account of the Foxglove* is a pharmacological classic. These four men illustrate the clinical epidemiologist of the period—observant, proceeding by induction, seeking always the way of prevention.

(ii) *Lead Colic and Scurvy.*

But infectious disease was but one field of exploration. At the beginning of the eighteenth century the dominant figure in European medicine was Boerhaave of Leyden, who, though not himself a great investigator, urged others on in the path. One of his principal subjects was the physiology of digestion, which a generation later was taken up by Haller and subsequently by Spallanzani. Whilst these three physiologists were endeavouring to decide between the mechanical theory of digestion as against the chemical, the practical-minded English practitioner was tackling alimentary problems as and when they arose. In 1692 there was born at Totnes in Devonshire John Huxham, son of a local tradesman. In early life he displayed a strong bent to medical study, and in due course was sent to Leyden to be a pupil of Boerhaave. On his return home, he settled in practice at Plymouth and began at once to carry out the teaching he had received. This meant observation of the body and its fevers, and of all that affected them, weather and the influence of season included, as Boerhaave had

taught him. He kept meteorological registers for thirty years and voluminous records of the epidemic seasonal fevers with which he met in practice.[1] His books had a wide circulation and were translated into French and German, and his influence in England in the early part of the century was unique.

'Huxham neglected no efforts which he thought might conduce to his professional advancement, and believing that the appearance of being extensively sought for and employed was one of the most certain means of actually becoming so, descended to expedients which his better judgment could not have approved. He would, it is said, go to chapel, order his servant to call him out in haste—when he was not really wanted—get upon his horse, and ride furiously out of one gate of the town and in at another. He affected great gravity, dignity of manner, and peculiarity of dress, and wore, as his ordinary costume, a scarlet coat with ruffles at the wrist, and a cocked hat.'[2]

'A realistic presentment recalls his figure, as, conspicuous in a scarlet cloak, flowing wig and velvet dress, ruffled shirt and golden snuff-box, he moved with affected strut and simulated gravity from house to house; or was carried in his sedan chair, with link-boys in attendance, when the nights were dreary. No one was more conscious of these elaborate impositions than Huxham himself, and he confessed that, although he laughed when he indulged in them, they largely contributed to his prosperity.'[3]

'Although he had several competitors in Plymouth of character and attainments more than respectable, none were able to compete with him in energy and assiduity—none in extent of professional knowledge, or in the tact with which he applied it to the recognition and alleviation of disease. His aptitude in seizing on the really important points of a case, and felicity in the selection of means wherewith to meet them, are points in

[1] *Essay on Fevers*, 1739; *De Morbo Colico*, 1752; and *Malignant Ulcerous Sore Throat*, 1757.

[2] *Biographia Medica Devoniensis*, by William Munk, M.D.

[3] Whitfield's *Plymouth in Times of War and Peace*, 1900.

his professional character which, handed down by tradition, are abundantly exemplified in his writings.

Mr. Pettigrew has justly remarked that Huxham "is one of the few physicians who has chosen nature for his guide, and by attentive observation viewed the various phenomena of disease and treated it on philosophical principles". Plain good sense, minute and careful observation, and cautious induction, characterise all Huxham's writings.' (*Munk.*)

One of the subjects which arrested his attention was the seasonal colic and palsy which was suffered by his patients who drank the Devonshire cider. In the winter of 1724–5 Huxham found it so common 'that there was scarce a family amongst the lower rank of people that had it not', and he sometimes saw five or six persons lying ill of it in one house. He was the first to describe this condition in 1739, though he did not know the cause of it. A similar malady was observed by Cadwaladr in 1745 in the West Indies in drinkers of rum distilled through leaden pipes, and in 1757 by Tronchin, the talented physician of Geneva, in drinkers of lead-sweetened wine. Ten years later this mystery was cleared up by Dr. (afterwards Sir) George Baker, a near neighbour of Huxham in Devonshire, though he did not practise there, who rose to become President of the College of Physicians. His *Essay concerning the cause of the Endemical Colic of Devonshire* showed that the disease was connected with large pieces of lead used in the vats and cider-presses, and he extracted lead from the cider itself. His work, though it concerned a small and circumscribed problem, was so logical, accurate, and inductive, that it afforded a new method of investigation into the contamination of food supplies, which has been pursued by innumerable workers ever since. It opened a new chapter in the book of Preventive Medicine.

Another disease which arrested Huxham's attention, as it had medical observers before the eighteenth century, was *scurvy*, and in 1747 he recommended that the sailors who were disabled by this malady, which was not only exceed-

ingly rife but very disabling and fatal, decimating fleet after fleet, particularly in Lord Anson's Expedition to the South Seas in 1740, should be fed regularly on a vegetable diet and a pint of cider a day. Dr. Mead recommended the same course in 1749, and he was always for fresh air and hygiene. 'Dr. Mead lived more in the broad sunshine of life', said Johnson, 'than almost any man', a pleasant ideal for us all. Three years later the scurvy of seamen was described and investigated by Dr. James Lind of Edinburgh (and afterwards of Haslar), who found that the disease was due, not as had been alleged to drinking sea-water or living in 'putrid air', but to certain dietetic deficiencies, particularly to the lack of fresh water and vegetables and greens, and an excess of salted meat. He revived an old recommendation that oranges and lemons should be used, and he described a method for preserving lemon-juice for long voyages.[1] Many years afterwards the use of lemon-juice and the adoption of personal hygiene by Captain Cook in his voyage round the world, by Admiral Wager in the Mediterranean, and by Sir Gilbert Blane in Lord Rodney's fleet, abolished this immemorial disease from the mercantile marine and the British navy. Nor was the navy alone the object of improved hygiene, for in 1752 there was published Sir John Pringle's classic work on *Diseases of the Army*, which exerted an enormous influence on the progress of Preventive Medicine generally.[2] Both these medical officers, the one at Haslar and the other physician with the army, became illustrious as exponents of Preventive Medicine. Never before or since had the civil population learned so much essential hygiene from the services. Pringle's recommendations for soldiers abroad found abundant application at home; and Lind wrote on fevers and the prevention of infection (1761), on tropical

[1] *On the Scurvy*, 1752.

[2] The greatest text-book on Hygiene in this period was the *System of Medical Polity*, by Johann Peter Frank, the Bavarian, published at Vienna in 1777–88 (4 vols.).

medicine (1768), and on the health of seamen (1774). Sir John Pringle was not quite an ordinary medical practitioner. A pupil of Boerhaave, he became Physician-General to the British Army in Flanders and elsewhere (1742–9), and out of his varied experience became one of the greatest exponents of Hygiene of his time. Similarly, Willan, Prout, and Wells, instead of becoming private practitioners, devoted themselves to special scientific studies. Willan differentiated skin diseases, Prout worked at the chemistry of gravel, stone, and body metabolism, and Wells studied the cause of the formation of dew.

(iii) *Health in the Factory.*

The industrial development of England towards the end of the eighteenth century led to the employment of large numbers of children sent for the purpose by the Poor Law authorities from agricultural to industrial districts. The unsatisfactory physical and social conditions of these parish 'apprentice' children soon became a subject of public concern. Compassion for the chimney-climbing boys began soon after the middle of the century, but it was later that the children came to the cotton mills. The stronger children were kept for home labour, the weaker and younger were sent in batches to the northern and midland factories. In 1795 Dr. Aikin gave an account of such batches of London children who had been dispatched for a number of years to the cotton mills in Manchester. He described their separation from their parents, their long hours of work under insanitary conditions, and the sickness and invalidity which resulted. But a few years before this date, there was an outbreak of fever in certain mills in the Manchester district, and the magistrates called for a medical committee to investigate the matter, among the members of which were two practitioners, Dr. Thomas Percival, F.R.S., and Dr. John Ferriar, the literary author of *Medical Histories and Reflections*. That was the beginning of a far-reaching national medical service. They found excessive hours of

labour, unwholesome conditions and insanitation fostering the spread of infectious disease. They found young children enslaved in a system which was directly harmful to body and mind. These facts were brought before a voluntary Board of Health which they and their friends had devised in 1796, with the result that the question of factory hygiene and regulation by law was brought to the attention both of the authorities in Manchester and the Imperial Parliament in London. Some years afterwards Sir Robert Peel acknowledged his indebtedness to Percival and his associates in the preparation of the Health and Morals of Apprentices Act of 1802, the first of that great stream of factory laws, the influence of which has revolutionized health in industry throughout the world.

Percival was the accomplished friend and correspondent of Haygarth of Chester, and both of them were friends of Fothergill, with whom they used to discuss their clinical and epidemiological problems when he came north for his summer holiday to Lea Hall in Cheshire. Born at Warrington in 1740, Percival settled in Manchester in 1767, where he had a large practice and was physician to the Infirmary. He wrote on hospital regulation, medical ethics, bills of mortality, and small-pox and measles. In 1770–3, being a mathematician, he occupied what leisure he could secure in devising methods for the enumeration of the population, and for accurate death returns and disease incidence. He was one of the founders and President of the Literary and Philosophical Society of Manchester, the fever hospital, and the Board of Health. He was the friend of De Quincey, Voltaire, Diderot and Condorcet, an acute and scientific observer, and a strong believer in the preventive aspects of medicine. He had the same human message to deliver as John Howard, the English prison reformer, and the Prussian chaplain Süssmilch in his 'Divine Order' of 1742—that the greatness of a nation depends not only upon material and financial resources, but upon an industrious, healthy, native population, justly dealt

with through good and evil. He was the leader of that long line of medical practitioners who, in the nineteenth century, saved the health of the factory worker.

Closely akin to this reform is that of sanitation and housing, of which, indeed, there is little to say. The old street and cleansing enactments of the fourteenth and fifteenth centuries were continued and revised. Something of a new era began with certain Improvement and Paving Acts, but the slums and rookeries of London were not dealt with seriously by the State until the nineteenth century. Insanitation, miserable housing accommodation, indifferent water-supply, window taxation and similar disadvantages abounded. Cleanliness, ventilation and better food did most, in Dr. Heberden's opinion, to improve the public health, though Sir Gilbert Blane would also have attributed some credit to sanitation.

(iv) *Spirit-drinking.*

Whilst the general standard of living in England improved in the first twenty years of the eighteenth century, there was a serious set-back between 1720 and 1750, during which period the number of deaths greatly exceeded the births. This has been attributed to the orgy of spirit drinking which characterized the period. Gin became in fact 'the real grand destroyer'. Distilling was a new trade in England, and as it provided a revenue for the State and at the same time gave the farmer a favourable market for cereals, it received widespread support from the landed interest, from the distiller and retailer, and from the consumer. Accordingly, Parliament itself promoted the production and consumption of spirits. In a few years the results became so disastrous that the College of Physicians and numerous grand juries and sessions petitioned Parliament to impose restrictions. The number of pot-houses increased to such an extent that there was one to every six houses and every forty-seven persons. Maitland says that 'the excessive drinking of spirituous liquors

has so enervated the stomachs of the populace as to render them incapable of performing the offices of digestion, whereby the appetite is so much depraved that its inclination to food is much lessened and the consumption of provisions greatly diminished'.[1] In 1750, London physicians directly attributed 14,000 cases of illness in the metropolis to the excessive drinking of gin. Hogarth illustrated the results in his representation of 'Gin Lane', and Smollett said that 'such a shameful degree of profligacy prevailed that the retailers of this poisonous compound (gin) set up painted boards in public inviting people to be drunk for the small expense of one penny, assuring them they might be dead drunk for two-pence, and have straw for nothing; they accordingly provided cellars and places strewn with straw, to which they conveyed those wretches who were overwhelmed with intoxication; in these dismal caverns they lay until they had recovered some use of their faculties, and then they had recourse to the same mischievous potion'.[2]

Scarisbrick, the Inland Revenue officer, writing of this period says that 'drunkenness abounded. By 1720 we had become a nation of tipplers. The nobility patronized brandy, the well-to-do middle classes drank a newly-introduced spirit called rum; the working-classes imbibed a characteristic spirit known as British gin. The consumption of gin was enormous.' When certain restrictions which had been temporarily imposed were repealed in 1733, he says, 'England touched a lower depth of inebriety than ever known before or seen since. The prevailing intemperance was the most momentous event of the eighteenth century'.[3]

With a view to meeting the problem thus created, Parliament passed a series of Gin Acts. In 1736 it imposed

[1] *History of London.*

[2] *History of England,* ch. xviii.

[3] *Spirit Manual, Historical and Technical,* by J. Scarisbrick, Burton-on-Trent, 1891, pp. 39-40.

a high duty on spirits and a high fee on licences. Though at first this effected some reduction, things soon became worse than before, and maximum sale and consumption occurred about 1743. After various abortive measures, the Acts of 1751 and 1752 took effect. They aimed at the suppression of gin-shops and private retail sales.[1] Lecky held that these measures were efficacious, but even at the end of the century Dr. Willan wrote that 'on comparing my own observations with the Bills of Mortality, I am convinced that considerably more than one-eighth of all the deaths that take place in persons above twenty years old, happen prematurely through excess in spirit-drinking'.[2] In addition to legislative action, the scientific evidence against the excessive consumption of alcohol was presented by Dr. Cadogan, Dr. Trotter, and other medical men, and the public-spirited action of Wilberforce and his friends created a more enlightened opinion and healthier habits among the people. Dr. Cadogan's book on gout is perhaps the most remarkable preventive treatise on the evils of intemperance that appeared in the eighteenth century.[3] It passed through ten editions in two years.

(v) *Midwifery.*

In 1741, when William Hunter came to London, he stayed at the apothecary's shop of William Smellie in Pall Mall. Like himself, William Smellie was an active young Scotsman from Lanarkshire, who, after wandering on the Continent, devoted himself to obstetric practice in London, where he soon filled a pre-eminent position. He was the friend and teacher of Tobias Smollett, learned his midwifery in Paris, and settled in London in 1739 as practitioner and teacher. His famous text-book of three volumes was one of the stable foundations of the science

[1] *History of Liquor Licensing in England,* 1700–1830, by S. and B. Webb, 1903 ; and *London Life in the Eighteenth Century,* by M. D. George.

[2] *Report on Diseases in London,* 1801.

[3] *A Dissertation on the Gout and all Chronic Diseases,* 1771.

and art of midwifery. Indeed, modern midwifery in this country may be said to have begun with him. For he did two great things. In an age of woman midwifery, he led the case in favour of the man obstetrician, and he introduced new methods—for the pelvimetry of contracted and normal pelves, for the safe use of the forceps, for the diagnosis and treatment of placenta praevia, and for improved modes of version. He was rather an uncouth person, and on that account never acquired a large practice among the upper classes, but his knowledge, skill, and teaching powers placed him easily in the forefront, and he did more than any other individual to advance obstetrics in the eighteenth century. 'No real improvement in the art of midwifery could occur', says Dr. Fairbairn, 'till medical men had the opportunity of studying natural or physiological labour, instead of being called in merely when some extensive or mutilating operation was required. Hence the rise of the man-midwife marks a very important stage in the history of obstetrics.' This was accomplished, amid much opposition, by Smellie, who, not content to be himself a man-midwife, set about the business of educating 900 others. He introduced the plan of extern districts for men students to gain experience in midwifery.

Two remarkable men followed Smellie, William Hunter and Charles White of Manchester. William Hunter was primarily an anatomist. He was a dissector and a follower of the body rather than the book; he added knowledge of the anatomy of the testes, the lachrymal glands, the lymph vessels, congenital hernia, varicose aneurysm, the foetal circulation of the placenta, and the gravid uterus; he founded a school of anatomy in which were bred some of the masters of medicine; and he taught John Hunter. 'If it had not been for William, we never could have had John.' When teaching anatomy, William Hunter practised as a surgeon, but later on, when he took his physician's degree, he practised mainly as an obstetrician. But in truth nothing that came within his medical scope was

foreign to his mind. For many years he was the acknowledged leader in midwifery in London. His practice was conservative, and he discouraged the use of the forceps, yet more than any one of his time, by his skill, his anatomical knowledge, and his urbane and conciliatory manner, he commended the employment of the man-midwife, and thus contributed to Preventive Medicine. For wise, careful, and sound midwifery is Preventive Medicine in being.

Charles White, F.R.S., was a pupil of the Hunters. He was born in 1728, and after studying in London and Edinburgh, became one of the founders of the Manchester Infirmary and medical school. Though he began as a surgeon and did valuable work in regard to the preventive surgery of fractures, dislocations, and haemorrhage, his genius found its fullest expression in his epoch-making treatise 'On the Management of Pregnant and Lying-in Women and the means of curing, but more especially of preventing, the principal disorders to which they are liable', published in 1773.

In this wonderful little book, White dealt with the general management and hygiene of child-birth, and the cause and prevention of puerperal fever. He argued that domestic insanitation exerted a direct effect in favour of sepsis, and hence he advocated 'maternity homes'; and that as in the early months of pregnancy there were personal factors at work which proved mischievous to healthy delivery, he recommended systematic ante-natal supervision. He claimed that it was retained and putrefying lochia which generated the puerperal sepsis that carried off so many patients. 'The danger does not arise from the smallness of the quantity of the discharge', he says, 'but from its stagnation, whereby it becomes putrid, and in this state is absorbed into the circulation.' After giving a full account of the signs and symptoms of puerperal fever, he offers suggestions for its prevention. These consist mainly of (*a*) cleanliness of the patient, her bedding, clothing, and surroundings; (*b*) the early adoption of the sitting-up

position after delivery; (*c*) the dietary; (*d*) fresh air and suitable temperature of the lying-in ward; and (*e*) disinfection. By his method of dealing with the lying-in woman, he claimed that he had never lost a case by puerperal fever. He attributed puerperal sepsis to 'effects of mismanagement in the accoucheur or nurses, or else arises from the patient's own imprudence'.

Owing to the high death-rate among lying-in women, Sir R. Manningham had, as early as 1739, advocated the establishment of a special lying-in hospital in connexion with the Westminster Workhouse, and in the next ten or twenty years several similar and larger institutions were opened separately, or in association with the general hospitals. In 1790 White followed suit and founded the Manchester and Salford Lying-in Charity, which, five years later, established a special hospital. 'In the nurture and management of infants, as well as in the treatment of lying-in women', wrote Dr. Lettsom in his *Medical Memoirs* of 1774, 'the reformation hath equalled that of the small-pox; by these two circumstances alone incredible numbers have been rescued from the grave.' The success of these institutions stimulated the establishment of other special hospitals, and particularly of dispensaries, for the infant poor in 1769, for general sickness in 1770, and for inoculation when that method became the fashion in the treatment of small-pox. Like the general and special hospitals, the foundation of which was a characteristic of the period, dispensaries were often originated by medical practitioners desiring a wider field for clinical work or teaching medical students. Fothergill, Lettsom, Armstrong, Wells, and Willan were among the leaders in this method of bringing the advantage of medical treatment, homely advice and personal hygiene to the great mass of the people. In conjunction with such popular books as Dr. William Cadogan's *Nursing and Management of Children* (1750), Lettsom's *Hints* in leaflet form, the works on hygiene and paediatrics by Armstrong and Michael Underwood, and the English

translation of Tissot's *Advice* on health, they did much to organize medical and public opinion in the direction of infant and child welfare. It was the beginning of a movement which reduced child mortality from 74 per cent. of children born in 1730–49 to 13 per cent. in 1924.

(vi) *Medical Education.*

Preventive medicine depends upon education, and medical education in England may be said to have been first organized in the eighteenth century. Its evolution proceeded by four steps. First, there was from ancient times a system of apprenticeship, by which the medical practitioner had a pupil or apprentice to whom he taught the art and mystery of his craft. Then when hospitals were established the physician or surgeon took his apprentice to 'walk the wards'. This began at St. Bartholomew's in the seventeenth century, and the practice was adopted at the London Hospital in 1741, and at Edinburgh even before that. The London hospitals made informal arrangements with their medical staffs that their private apprentices should take a course of hospital work under their supervision. This arrangement proved advantageous, not only to the student but to the hospital, for the student undertook a certain amount of routine work of the hospital service; and in due course buildings and appliances for the establishment of medical schools within or adjacent to hospital precincts, were provided. The fees of the students went to the maintenance of the School and the payment on a share basis of the teachers. Thus the private apprenticeship system became something of a communal apprenticeship system in the hospitals. The medical staff became a medical faculty, and the apprentices became clerks and dressers in the wards. The third step was the holding of private classes in chemistry, anatomy, and pathology, and of clinical classes at the hospital. Before John Hunter, surgery was well taught only in Paris, and before the Monros began at Edinburgh, anatomy flourished only on

the Continent. Private instruction, such as that of Cheselden and Pott in surgery, Smellie's school of obstetrics, the Hunters' school of anatomy and surgery, Baillie's classes in morbid anatomy, and Harrison and Blizard's clinical class at the London Hospital were the beginning of our modern ways.[1] The fourth stage, which overlapped with these proprietary classes, was the establishment of Chairs in the Universities. At the opening of the century, Chairs of Anatomy were founded at Edinburgh, Cambridge, Glasgow, and Oxford, and Chairs in clinical medicine at Edinburgh and Oxford. The London Medical Schools grew up in the eighteenth century alongside the great new hospitals which had just been built, Guy's, St. George's, the London, and Middlesex. In the following century they became associated with the University of London, but at first they were proprietary schools conducted wholly by medical practitioners. The unique position of Edinburgh in the eighteenth century was largely due to the fact that it was the most flourishing *university* Medical School in Great Britain. It was Pitcairne, Monro, Rutherford, and Cullen who made it so. And the medical education both within the medical schools and beyond their walls was stimulated by the formation in the last half of the century of numerous medical societies which followed the example of the Royal Medical Society of Edinburgh founded in 1734.

Thus the clinical bedside tuition of Boerhaave at Leyden was adopted in Britain in the eighteenth century, and developed into the clerking and dressing in the ward which became characteristic of medical education in this country. The proprietary classes in chemistry, anatomy, and pathology became University classes, and the teaching in the old physic gardens, which were numerous, became organized classes in botany and pharmacology. The Canon of Avicenna, the *Ars parva* of Galen, and the Hippocratic

[1] For further particulars of these classes, see Peachey's *Memoir*, loc. cit., and *Medicine in England during the Reign of George III*, by Arnold Chaplin (1919).

aphorisms still taught in the seventeenth century, thus gave way to apprenticeship and clinical work in the hospitals, and this in turn developed in the nineteenth century to fully organized University Medical Schools.

(vii) *Inoculation and Small-pox.*

I come lastly to the greatest of all the medical achievements of the eighteenth century, the introduction of the practice of immunity. It happened in this way. In 1713 Dr. Timoni, a Greek of Constantinople, wrote a letter to Dr. Woodward of London giving him 'an account of the procuring of small-pox by incision or inoculation, as it has for some time been practised at Constantinople'. This letter excited much interest in English medical circles, and through the good offices of Sir Hans Sloane, Dr. Pylarini of Venice, who had in fact practised inoculation in Constantinople, was induced to give his version of the practice. Thus it came about that in 1721 inoculation by slight puncture and insertion of the fluid matter from a small-pox sore was tried tentatively in London. In the meantime, Lady Mary Wortley Montagu, the wife of the British Ambassador to the Porte, 1717–18, had had her own child, a boy aged five, inoculated by a Greek woman under the direction of Maitland, the surgeon to the Embassy, and in 1721 Lady Mary got Maitland similarly to inoculate her little daughter, four or five years old, in London. As these and other cases quickly recovered, the Princess of Wales had her two children inoculated, and thus a custom for the practice was established. Owing to the advocacy of Mr. Maitland and of Dr. Nettleton of Halifax, there were as many as 200 inoculations in 1722, and 293 in 1723. No doubt the custom would have spread had it not been for the opposition of certain medical men, and some unexpected and apparently inexplicable fatalities, the effect of which was that from 1728 to 1740 inoculation, the transmission of 'artificial' small-pox by inoculation from a case of natural small-pox, fell into abeyance.

Now it happened that at about the same time that inoculation was introduced here, it was also tried at Boston in New England, and later on in 1738 at Charleston in South Carolina, and there the practice followed by Kilpatrick was to inoculate very slightly and from artificially produced small-pox—i. e. from the inoculated and not from natural small-pox. In 1743 Kilpatrick came to London and, assisted by Dr. Frewen of Rye, a pupil of Boerhaave, carried out a large number of inoculations from arm to arm —artificial small-pox derived from artificial small-pox. Others went a step farther in attenuation by inoculating with recent fluid matter before the variolous fever had matured. Some inoculators, indeed, preferred to weaken the material inoculated so much as to make two inoculations necessary for protection. After 1754 the practice spread, and was encouraged by charitable agencies and dispensaries for gratuitous inoculation of the poor. In 1775 Lettsom projected a scheme for inoculating infants in their homes. Otherwise, as he urged, it came too late, as most children born in London contracted small-pox before they were seven. Yet in spite of the widening custom of inoculation, it did not prove itself a preventive of the disease. Indeed, it increased its incidence if not its fatality. Then, as now, there were also mild types of natural small-pox. 'There were cases which a physician could not save', said Wagstaffe, 'and cases which a nurse could not lose.' But the London Bills of Mortality continued to show to the end of the century an average of 1,800 to 2,000 deaths from small-pox every year.

(viii) *Edward Jenner, Village Doctor.*

It was this situation which stirred the inquiring mind of a certain village doctor down in Gloucestershire. His name was Edward Jenner, and he was born in 1749 at the vicarage of Berkeley. After school-days at Wotton-under-Edge and Cirencester, he was apprenticed to Mr. Ludlow, a surgeon at Sodbury near Bristol, and there, about 1768 or

1769, he heard a young countrywoman say that she could not take small-pox, 'for I have had cow-pox'. This he pondered in his mind. In 1770, when he was twenty-one, he came to London to be a resident pupil of John Hunter. They became great friends. Both of them were naturalists, but from the elder the younger received a new and enlarging inspiration, wider and deeper than his schoolboy lore of birds' nests and fossils. Happily Jenner declined an offer to go seafaring with Captain Cook, and after his two years with Hunter he returned to Berkeley, and there he lived the happy and busy life of a country practitioner. 'His height was rather under the middle size, his person was robust, but active and well-formed. In his dress he was peculiarly neat, and everything about him showed the man intent and serious and well prepared to meet the duties of his calling. . . . He was dressed in a blue coat and yellow buttons, buckskins, well polished jockey boots, with handsome silver spurs; and he carried a smart whip with a silver handle. His hair, after the fashion of the times, was done up in a club, and he wore a broad-brimmed hat.'[1] In 1772 he began to receive some wonderful letters from Hunter, and these continued for twenty years. 'I shall be glad', wrote Hunter, 'of your observations on the cuckoo and upon the breeding of toads; be as particular as you can.' Again, 'I wish you could remove the cuckoo's egg into another bird's nest, and tame the young one, to see what note it has. There is employment for you, young man.' Hunter wants many facts about blackbirds, bats, salmon spawn, herons, and always cuckoos; 'Send everything you can get, either animal, vegetable, or mineral'. Jenner has a disappointment in love. 'I own I was glad', writes Hunter, 'when I heard you was to be married to a woman of fortune, but "let her go, never mind her". I shall employ you with hedgehogs.' They discussed inoculation and cow-pox, for about 1775 Jenner thought of little else, and it was either in discussing this question or

[1] *Life of Edward Jenner*, by J. Baron, 2 vols. 1838, i. 15.

a case of its kind that Hunter made his famous reply to Jenner, 'Don't *think*, but *try*; be patient, be accurate.'[1] In a letter from Hunter to Jenner dated August 1775, he refers to an experiment on a hedgehog, and he adds: 'Why do you ask me a question by the way of solving it? I think your solution is just; but why think,—why not try the experiment? Repeat all the experiments and they will give you the solution.'[2] And this was the same John Hunter who said to Cline, 'I love to *think*'.

Jenner talked to his fellow practitioners and neighbours, and in 1780 he told one of them, as they rode together, of the idea growing in his mind that cow-pox might prove the antidote to small-pox. Early in 1788 he married, and in 1789 he made the great venture and inoculated his own child, a few months old, with swine-pox matter, and subsequently on three occasions with small-pox virus. *None of these small-pox infections gave the child the disease.* Seven years later (1796) he inoculated James Phipps, aged 8½ years, with cow-pox matter from the hand of a dairy-woman who had contracted cow-pox from her master's cows, and three months later he inoculated the child with matter from a small-pox case. *Phipps did not get the disease.* Jenner continued his observations, and two years later published his immortal 'Inquiry into the causes and effects of the variolae vaccinae, a disease discovered in some of the western counties of England, particularly Gloucestershire, and known as the Cow Pox' (1798). Jenner was now a famous man with a unique repute spreading all through the world, and his 'vaccination' a universal method for preventing small-pox. Then, as now, there were critics and opponents. In 1811 he wrote to Lettsom that 'the chief impediments to its general adoption are our newspapers and some of our magazines. Whenever a case of what is called failure starts up, in it goes to a newspaper, with all the exaggeration with which envy and malice can garnish it.' Even educated people, he complained, 'decide upon

[1] Baron, i. 124. [2] Baron, i. 33.

the merits of vaccine inoculation unaided by a competent knowledge of the matter'.

What was it that Jenner actually did? He described cow-pox as he saw it in Nature, and he contributed to its differentiation from other similar outbreaks among animals. He showed that cow-pox was inoculable upon man, and could be transferred from man to man. Above all, he *proved* that vaccinia in man protected against small-pox. It may be said that not one of these three discoveries was new, and, speaking generally, that is true. Different persons, medical, veterinary, or lay, had made observations on these points. What Jenner did was to bring them together and *prove their validity*. It has been thus in all the great discoveries. Before Harvey, observers had written of the probable circulation of the blood, but it was left to Harvey to prove. Before Lister, observers had for a century noticed that wounds protected from the air or other forms of contamination healed better than wounds which had been exposed, but it was left to Lister to prove the case and demonstrate its practical application to surgery.

The Contribution of the Eighteenth-century Practitioner.

The four supreme advances in medicine in the nineteenth century were the discovery of anaesthesia and its application, the introduction of the antiseptic principle in surgery, the germ cause of disease, and immunology. It is the glory of the medical practitioner of the eighteenth century that he laid the clinical foundations upon which the nineteenth century built its brilliant superstructure. What was it that the practitioners did? They laboured as individuals with relatively little interrelationship or co-ordination. They often worked in the dark, and almost always inductively. They began to *use* the autopsy to check their treatment; they introduced methods of precision in diagnosis; and almost unconsciously they began to apply the new physiology to their clinical work. It is only now

that, looking back, we can weave their individual labours into terms of principle and collective advancement. They builded better than they knew. Turning the matter over in my mind, and as the result of both experience and reflection, I should say that quite apart from their contribution to culture and literature,[1] to therapeutics and to surgery, they moved English medicine forward in eight preventive directions:

(1) They explored the circumstances of epidemic disease, and observed the causative relation of external environment to it, including the effect of climate.

(2) They introduced the principles of medical notification, of isolation, and of fumigation and disinfection, though their disinfectants were probably not germicidal.

(3) They advocated an improved and enlarged dietary, combined with restriction of spirit drinking. Tea, coffee, vegetables, and fruit were warmly recommended by them.

(4) They initiated industrial welfare, and were the prime movers in the health and sanitary control of the factory system.

(5) They began the reformation of midwifery, first by undertaking the practice of midwifery themselves, and secondly, by improving the methods of delivery and the care of the lying-in woman.

(6) They first attacked systematically the problem of infant mortality.

(7) They lent their support and service to the establishment of dispensaries, hospitals, and medical schools.

(8) They laid the early foundations of immunity.

No one can read the sober terms of this astonishing achievement without realizing the fruitfulness of the 'Hunterian period' in its legacy to modern preventive medicine. Epoch-making as that period was in anatomy, physiology,

[1] A century must be considered rich in literary medical men which contains Mark Akenside, Tobias Smollett, Sir Richard Blackmore, Mason Good, Armstrong, Garth, John Arbuthnot, Crabbe, and Oliver Goldsmith.

and the new principles of surgery, as expounded and interpreted by the scientific giants of the century—

> Who speed the stars of thought
> On to their shining goals—

it was still more far-reaching in the sphere of Preventive Medicine, which not only extended the frontiers of life for many persons then alive, but laid the foundations of the Public Health system of the succeeding century. Moreover, it must never be forgotten that this development was the work of the *private practitioner*. The conception of practical prevention was born in his mind, and sprang out of his *clinical study and experience*. 'Human experience, which is constantly contradicting theory, is', said Johnson, 'the great test of truth.' Much of the work of the practitioner was immediately effectual; and all of it has proved in greater or less degree constructive. Like the great physiologists of his time, he returned to Nature for his observations and his guide, and like them he relied on her recuperative powers for his remedy.

The Practitioner of the Twentieth Century.

A profound change separates the private practitioner of the twentieth century from his forerunner in the eighteenth. There are, of course, abundant features and conditions in common between them, not the least being a growing and active sense of humanitarianism. But the gulf of a hundred years has fundamentally altered the outlook and occasion of the practitioner. There has been an immense growth in the knowledge and understanding of health and disease; great tracts of the unknown have been staked out and explored; owing to anaesthetics and asepsis, surgery has been revolutionized; the *vera causa* of many diseases has been discovered; and treatment has extended in all directions. The inevitable result has been a development of specialism. In the realm of Preventive Medicine this has led to the creation of special medical services, the appoint-

ment of medical officers for the poor, public vaccinators, medical officers of health and of schools, police and factory surgeons; and a further evolution of the medical services for the army, navy, air forces, and the British Dominions beyond the sea. Then there have come to be specialists in tuberculosis and venereal disease, in diseases of the skin, eye, ear, nose and throat, the heart and lungs, and nervous system; and, alongside all this, an ever-narrowing specialism in pathology, bacteriology, and mechano-therapeutics. Moreover, many workers now devote their whole time to research work in the laboratory or otherwise.

The old order has vanished. *But the practitioner remains*, and, although he appears to be restricted in sphere because of the growth in specialism, he is not less important or effective. As our first line of defence against disease, he is the heir of two centuries. But he is more than that, as we shall see in a moment. Whilst the claims on him have grown socially more insistent and medically not less exacting, his power over disease has increased. The labours of his predecessors have removed many of his difficulties—pain and sepsis have been reduced, the 'fate' of scourge and pestilence has gone, facilities and institutions have been provided, instruments of precision have been invented, his education and equipment has been vastly improved, his professional status and opportunity enlarged. In the rapid growth of knowledge and skill, surgery has enormously widened its borders and become more preventive and conservative in spirit;[1] a dozen vaccines are at the disposal of the practitioner, and a whole new pharmacopoeia of organo-therapy and serum-therapy is available. The age of humours and miasmata has given place in the medical mind to the reaction of the body as between seed and soil, as between predisposition and resistance, as between certain cause and known effect. Scurvy and small-pox, typhus fever and cholera have vanished from the daily

[1] See *Recent Advances in Medical Education in England*, 1923, p. 126.

routine, and the practitioner of the twentieth century faces a future of conquest of disease undreamt of by his predecessor of the eighteenth century. Nor can the general practitioner any longer escape definite relationship with the existing system of medical responsibility or fail to answer to the call to a wider sphere. For in whatever direction we look we find an ever-increasing burden of professional duty imposed upon him, with an ever-increasing responsibility to his medical colleagues and to the State.

In the great movement of polity by which the State has come to the aid of the individual citizen, three new conditions have emerged, the tendency of which has been to bring the practitioner of the twentieth century into an organized scheme of national Preventive Medicine. First, the statutory duties imposed upon the doctor in behalf of prevention have been greatly extended;[1] secondly, the old contract and club practice which began with the dispensaries of the eighteenth century has been transformed into the National Health Insurance system, by which a practitioner service has been provided for fourteen million people; thirdly, the practitioner himself has become a direct agent in working for the health of the community as well as the individual.[2] These are the governing circumstances which make the practitioner of the twentieth century something more than heir of the past, *for they give him new powers of using the legacy of the past to its highest advantage.*

[1] Ibid., p. 127–8.

[2] It is sometimes alleged that the public medical services are designed to exclude the private practitioner. But the contrary is, in fact, the case. For example, the Poor Law Medical Service has 4,000 medical officers for outdoor medical relief, practically all of whom are private practitioners; the Post Office list of 3,500 medical men are all practitioners; out of 1,450 Medical Officers of Health, 1,100 are private practitioners, and only 350 are whole-time officers; of the 1,800 medical men engaged by local education authorities in the inspection and treatment of school children, 1,000 are in private practice; of 1,770 certifying factory surgeons, all, hardly with exception, are private practitioners; and the whole of the national insurance service is in the hands of private practitioners.

They create for him a new occasion. For they secure two practical results. They bring the patient to the doctor at an earlier stage, so that he may observe the signs and symptoms of the beginnings of disease, when the condition is both correctly diagnosable and more amenable to treatment. 'If we do not know the early signs of disease', wrote Sir James Mackenzie, himself a practitioner, 'there is little hope of our achieving the aim of Medicine—the prevention of disease.'[1] They also enable the practitioner to interpret the purpose of preventive medicine not merely as the negation of disease, but as attaining the highest possible standard of personal health, resistance and capacity of body and mind. In a word, both the cause of disease is now more open to us, and the answer to it is no longer only a drug but a way of life. The ideal of medicine is by prevention to defeat disease and lengthen man's days, but still more in the ultimate issue to emancipate the imprisoned

[1] *The Future of Medicine* (1919). The author urged the need for a closer study of the first signs and subjective symptoms of disease; the predisposing conditions, the antecedent irritations (as in cancer), the part played by earlier disease (as in measles and its sequelae), the infective processes set up by dental sepsis, the investigation of pain and of irregular heart action, the observation of the effect of drugs, the classification and assessment of symptoms, the estimation of functional efficiency. Here is ample suggestion for the future work of the private practitioner, but if we desire more definite guidance, it may be found in the necessity of answering the questions of the patient. (1) What is the matter with me? This is *diagnosis*; (2) Can you put me right, and when? This concerns *treatment* and *prognosis*; (3) How and why did I get it? This raises *causation*; and (4) How can I avoid it in future? This is *prevention*. These are questions every patient asks in some form or other. The sound and considered answer to them is the duty of the practitioner. In the child welfare service, the school medical service, the insurance system and the factory, he may now get his patient at the beginning of sickness; in his maternity cases he now gets, or should get, the advantage of ante-natal supervision, in paediatrics of scientific feeding, in cardiac and alimentary disease instruments of precision and tests; the fulfilment of his statutory obligations in respect of infectious disease, including tuberculosis and venereal disease, provides him with preventive methods; every patient is a field of exploration and investigation into the causation of disease, and rheumatism, cancer, and the epidemic nervous diseases afford an urgent occasion; every patient too is entitled to advice in personal hygiene.

splendours of the human spirit, and furnish a larger degree of happiness, contentment and capacity. To achieve this larger liberty for man, it is necessary to follow in the footsteps of John Hunter and build on the foundations of his day, taking Nature for our guide, learning her secrets and being obedient to her laws.

DATES IN LIFE OF JOHN HUNTER

1710 Birth of Cullen and Heberden (*Commentaries*, 1802).
1711
1712
1713
1714

1715
1716
1717
1718 Birth of William Hunter at Long Calderwood, Lanarkshire.
1719
1720
1721
1722

1723
1724
1725
1726

1727
1728 Birth of John Hunter at Long Calderwood.
1729
1730
1731 William Hunter at Glasgow University.
1732
1733

1734

1735
1736
1737 William Hunter under Cullen at Hamilton.
1738

1739 Smellie settles in London.
1740

1741 William Hunter comes to London.
Smellie teaches Midwifery.
1742

SOME COLLATERAL MEDICAL EVENTS

1710 Epidemic of small-pox.
1711
1712
1713
1714 Idea of inoculation introduced into England.
Fahrenheit Thermometer.
1715
1716 Period of high infant mortality began.
1717
1718 Lady Mary Wortley Montagu's son inoculated for small-pox.

1719 Westminster Hospital founded.
1720 Mead, *Discourse on Plague.*
1721 Inoculation for small-pox practised.
1722 Ramazzini, *Industrial Diseases* (Eng. ed.).
Defoe, *Plague Journal.*
1723
1724 Guy's Hospital founded.
1725 Freind, *History of Physic from time of Galen.*
1726 Stephen Hales measures blood-pressure.
Edinburgh Medical Faculty founded.
1727 Sir Isaac Newton.[1]
1728
1729 Influenza pandemic, and epidemic in London.
1730
1731 Hoffman on Chlorosis.
1732
1733 St. George's Hospital founded.
Influenza epidemic in London.
1734 Royal Medical Society of Edinburgh founded.
Rogers on Epidemic Disease.
1735 Middle period of high death-rate in London (1720–50).
1736 Linnaeus, *Systema Naturae.*
1737 Boerhaave.[1]
1738 Population of London 725,000 (Maitland).
Methodist Revival.
1739 Manningham's Lying-in Hospital.
1740 Hoffman on Rubella.
London Hospital founded.
1741 Epidemic fever in London, highest mortality of century.

1742 Hoffman.[1]

[1] Died.

1743

1744
1745

1746 William Hunter's lectures begin.
1747
1748 John Hunter comes to London (Covent Garden).
1749
1750 Dissecting and Chelsea Hospital (with Cheselden).
1751 Dissecting and St. Bart.'s Hospital (with Pott).
1752 Smellie published text-book on Midwifery.

1753
1754 Surgeon-pupil at St. George's Hospital.
1755 The Hunters discover placental circulation.
1756 John Hunter House-Surgeon at St. George's.
1757
1758
1759
1760 John Hunter, staff-surgeon in the army. Hewson.
1761 Went to Belleisle.

1762 In Portugal and the Peninsula.
William Hunter Physician to the Queen.
1763 Settles in London (Golden Square).
1764
1765 Hunter's attempt to establish national school of anatomy.
1766
1767 Elected F.R.S.

1768 Settles in Jermyn Street. Elected Surgeon to St. George's Hospital.
1769
1770 Hunter's School moves to Windmill Street. Cruikshank.
1771 Marriage to Miss Ann Home.
Publishes *Natural History of Human Teeth.*
1772 Begins correspondence with Jenner. Earl's Court.

1773 Suffered from Angina.
1774 William Hunter publishes *Anatomy of Gravid Uterus.*

1775 John Hunter commences Course of Lectures on Surgery (1775–1790).
1776 Surgeon Extraordinary to the King.

1743 Stephen Hales on Ventilation.
Influenza epidemic in London.
1744
1745 Middlesex Hospital founded.
Corporation of Surgeons founded.
1746
1747 Haller's *First Lines* on Physiology published.
1748 Fothergill on putrid sore throat.
1749 Buffon, *Histoire Naturelle.*
1750 'Black Assize'. Hogarth's 'Gin Lane'.
1751 Population of England and Wales 6½ millions.
1752 Sir Hans Sloane,[1] Cheselden,[1] Sir J. Pringle on diseases of Army.
1753 Lind on Scurvy.
1754 Mead.[1]
1755 Huxham on Fevers.
1756
1757 Haller's *Physiology.* Lind's *Naval Hygiene.* Black on CO^2.
1758 Brocklesby's ventilated barrack hospital.
1759
1760 George III.
1761 Morgagni, *De Sedibus.*
Brindley, Watts, Arkwright period begins.
1762 Rousseau.

1763
1764 First pavilion hospital at Plymouth.
1765
1766
1767 Sir G. Baker on Devonshire colic. Monro.[1]
Haygarth at Chester and Percival at Manchester.
1768 Huxham.[1] Cullen's *Nosology.* Lind on tropical hygiene.

1769 Dispensaries for 'Infant Poor' founded.
1770
1771 Morgagni.[1]

1772 Rutherford on Nitrogen. Highest mortality of small-pox in century.
1773 C. White on Management of Child-birth.
1774 Hewson.[1] Howard, *Winter Journey.*
Priestley on Oxygen.
1775 Lavoisier on Oxygen.

1776 Adam Smith, *Wealth of Nations.*
Bentham's *Fragment on Government.* Cullen's *First Lines.*

[1] Died.

1777
1778 Publishes second part of Treatise on Teeth.
1779
1780 Dispute with William Hunter.
1781 Baillie comes to London. (Aged 20.)
1782
1783 Death of William Hunter. John Hunter moves to Leicester Square.
Now leading British surgeon.
1784
1785 His proximate ligature for aneurysm.

1786 Published Treatises on *Venereal Disease* and *Observations on Animal Economy.*
Appointed Deputy Surgeon-General to the Army.
1787 Reynolds's portrait. Received Copley Medal.
1788
1789
1790 Surgeon-General and Inspector-General of His Majesty's Forces.
1791
1792
1793 Death of John Hunter (October 16th). Buried in St. Martin's-in-the-Fields, re-interred in Westminster Abbey, 1859.
1794

1795 Publication of *Treatise on the Blood, Inflammation, and Gunshot Wounds.*
1796

1797
1798
1799 Corporation of Surgeons acquire his museum.
1800

1777 Haller.[1] Howard on Prisons.
1778 Voltaire.[1]
1779 Frank's Textbook on Hygiene.
1780 Fothergill.[1] Wilberforce.
1781 Cavendish on Hydrogen.
1782 Haygarth's fever wards.
1783

1784 Samuel Johnson.[1]
1785 Sir G. Blane on *Diseases of Seamen.* Withering on use of Digitalis.
1786 Lettsom on drug habit and alcoholism.

1787
1788 Influenza epidemic in London.
1789 Jenner inoculated swine-pox.
1790 Cullen.[1] Howard.[1]

1791
1792 Galvani on animal electricity. Gas-lighting.
1793

1794 John Dalton on colour blindness (Atomic theory, 1804). Erasmus Darwin.
1795

1796 Lemon-juice made compulsory in naval diet. Jenner vaccinates Phipps. Willan on Diseases of London.
1797
1798 Jenner's *Inquiry* published. Willan on skin diseases.
1799
1800 Bichat on the tissues. Sir Humphry Davy on Nitrous Oxide gas. Cuvier.

[1] Died.

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